IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 18, Issue 3 Ser. I (March. 2025), PP 50-56
www.iosrjournals.org

Performance and Cost Benefit Analysis of Broiler Chickens Fed Municipal Organic Food Waste (MOFW)

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Abstract
The study was carried out to assessed the performance and cost benefit analysis of broiler chickens fed vary levels of inclusion of municipal organic food waste (MOFW). Two hundred and twenty-five (225) Abor acre strains of broiler chickens were used in this experiment. The birds were randomly assigned to five (5) dietary treatments with forty-five (45) birds per treatment divided into five (5) replicates of nine (9) birds each. The feed trail was for a period of 56 days with starter and finisher phases respectively. The experimental diets includes: T_1 (0% MOFW) control, T_2 (5% MOFW), T_3 (10% MOFW), T_4 (15% MOFW) and T_5 (20% MOFW) meal respectively. Final weight, feed intake, weight gain and feed conversion ratio were monitored and cost benefit calculated. Data were subjected to analysis variance (ANOVA) SPSS software in a Completely Randomized Design (CRD). In starter, the feed intake recorded higher value among birds fed diet T_3 and T_5, followed by T_1, T_2 T_4. Nevertheless, at finisher phase (29-56 days), there were significant differences across treatment groups. T_3 recorded the highest value, when compared to T_2, T_5, T_4 and T_1.The result for weight gain at starter phase was better in T_1 (control), While in finisher phase (29-56 days), the results was higher in T_3 (10%). T_1 had the best feed conversion ratio in starter, and T_4 had best value at finisher stage. In cost benefit analysis, T_1 had the best profit margin at starter and T3 recorded the best profit margin at finisher. During finisher phase, birds fed diet containing 10% municipal organic food waste (T_3) inclusion yielded optimum result. Based on weight gain and cost analysis noted in this study, farmers are encouraged to include municipal organic food waste (MOFW) meal up to 10% level in broiler diets.

Date of Submission: 14-03-2025 Date of Acceptance: 26-03-2025

I. Introduction

Waste generation as a product from man's activities as he interacts with his environment, can be traced back to the early man's era; when man used materials like animal skins, bones and ivory to make the sheath for their swords, clothing, tools, weapons and others. The bulk of waste generated then was from animals, plants, shrubs and food leftovers (Ibikunle et al., 2019). The advancement in civilization, urbanization, industrialization and demographic growth has consequently increased the rate of municipal solid waste generation (Ibikunle et al., 2019). The United States of Environmental Protection Agency (Ibikunle et al., 2019) , defines municipal solid waste (MSW) as wastes generated on daily activities, which includes items like food residues, packaging box, grass and garden trimmings, damaged furniture, rags, bottles and cans, papers, electronics and electrical appliances.

With the rapid population growth associated with urbanization, which is expected to reach 9.7 billion people by 2050 (Ferguson, 2019), the rate of Municipal Solid Waste (MSW) generation is expected to increase significantly and the increase may be more than double in the next twenty years especially in lower income countries (Hoornweg and Bhada-Tata, 2012). According to Kaza *et al*., (2018), MSW generation rate is higher than the rate of Urbanization, therefore, it has been predicted that MSW generation will reach 2.2 billion tons by the end of 2025.

Food waste (FW) which involved the highest percentage of degradable household waste (Chow *et al.,* 2020), when properly and efficient handled can not only help to reduce environmental pollution, but may serve as potential feed materials in the livestock industry. Since the organic fractions have often a very high nutritional value, one of such suggested use would be the re-feeding of animals with this food waste. They may be used to feed livestock, thus, a substitute for traditional feedstuffs for pigs and poultry (García*et al.,* 2005).

However, billion tons of food waste which is landfilled annually, which accounts for up to one third of the total food produced for human consumption could be utilized as animal feed ingredients. Nevertheless, this

reseaech seeks to access the performance and cost benefit analysis of finisher broiler fed municipal organic food waste (MOFW).

II. Materials and Methods

Experimental Site

This experiment was conducted at the Teaching and Research Farm of Delta State University, Campus 1 Abraka, Delta State (latitude $5^0$48'N and longitude $6^0$06'E**).** Abraka is located. It is a city in Delta state where Delta State University is located. Abraka is marked by uniformity in the topography. It falls within the lowlands landscape, and be classified under the interior coastal lowlands of Western Nigeria (Ugbomeh, 2010).

Experimental Animal Management

Experimental Animals

Two hundred and twenty-five (225) Abor acre strains of broiler were used in this study. The birds were raised in two phases (starter and finisher), each phase in the experiment lasted for a period of four (4) weeks. i.e starter - four (4) weeks and finisher -four (4) weeks.

Housing

The broiler birds were raised in deep litter system. The birds were distributed into five (5) treatments and replicated five (5) times.

Feeding and Watering Procedure

The broiler birds were raised in different pens and fed the diets respectively. Feed and water will be given *adlibitum*.

Experimental Test Ingredients

The municipal organic waste (food waste) used for this study, was gotten from Abraka daily market. While the other feed ingredients that were used in formulating the diet were purchased from feed mill within Sapele (Rainbow feed) Delta State.

The proximate composition of test ingredient, experimental diets and ingredient composition for broiler starter and finisher are presented in Table 1, 2, 3, 4 and 5 respectively.

Preparation of Municipal Organic Food Waste Meal (MOFWM)

The municipal organic food waste (MOFW) that was used in feeding the broiler chickens passed through the following preparatory stages;

- Collection of food waste from the traders (markets).
- Removal of undegradable materials such as nylon, metals, etc
- Chopping/ cutting of waste into smaller pieces.
- Sun drying of waste until it is well dried
- Dried municipal organic wastes were grinded and combined with other feed ingredients that were used in formulating the diets for broiler starter, finisher and layer birds.

Experimental Diets

The experimental diets comprised of five (5) treatments as follows;

T_1 - 0% MOW inclusion level (control)
T_2 - 5% MOW inclusion level
T_3 - 10% MOW inclusion level
T_4 - 15% MOW inclusion level
T_5 - 20% MOW inclusion level

Data Collection and Computation

Performance

Feed consumption of birds was taken daily, while the live weight was taken weekly, from where the mean daily feed intake, average live weight and feed conversion ratio was calculated. The birds were weighed at the beginning of each phase of the experiments. The left-over feed was weighed before new feed were given to the birds.

- Average daily weight gain = $\frac{\text{Final weight-initial weight}}{\text{Number of days}}$

- Average daily feed intake = $\frac{\text{Total feed consumed}}{\text{Number of days}}$

- Feed conversion ratio = $\frac{\text{Average feed intake}}{\text{Mean weight gain}}$

- Mortality = No of birds that died during the experiment

Cost Benefit

The cost benefit analysis was based on the method applied by Anigbogu (2011).

- Cost of feed/kg (₦) = $\frac{\text{Total cost in Naira(₦)}}{\text{Quantity in kg}}$

- Cost of feed consumed/bird (₦) = cost/kg of feed x feed intake
- Cost of production/bird (₦) = cost/kg of birds + cost of feed consumed
- Sales = cost of selling a birds
- Profit = Sale – cost of production

Statistical Analysis

- Data were subjected to analysis variance (AVOVA) of SPSS software package in a Completely Randomized Design (CRD) as described by Steel and Torrie (2000). The mean separation for significant effect was done using LSD, Duncan New multiple range test.
- Statistical model: Yi = U + Ti + eij
- Yi = Overall observation
- U = Overall mean
- Ti = Effect of treatment
- eji = Residual error

III. Result and Discussion

Results on growth performance of starter birds (1-28 days) and finisher birds (29-56 days) are presented in Table 6. During starter phase, the mean final body weight of birds fed various diets varies across treatment, with control treatment recording the highest values, when compared to values obtained in T_2, T_5, T_3 and T_4, though the values where not significantly different. This low final weight observed in broiler at starter phase (1-28 days), mostly in diet containing MOFW level of inclusions may be due to high phytochemical content such as phytate and oxalate, that may has hinder nutrient absorption in birds. The report was in line with Abeke *et al.* (2008) and Ogunbode *et al.* (2013), who reported that high phytate and oxalate hinder protein and mineral absorption in animals. Daily feed intakes of birds on T_3 and T_5 in starter phase was similar, and were not significantly higher than what was obtained in T_1, T_2 and T_4, which was an indication that the feeds are palatable to the birds. The average daily weight gain was better in T_1, compared to values obtained in T_2, T_3, T_5 and T_4 respectively. The feed conversion ratio was also better in T_1, when compared to other treatment groups. The high value obtained for average weight gain and feed conversion ratio as noted in T_1, may be due to nutrient composition of the diet. The report was in line with Okonkwo *et al*. (2000) who recorded that growth of tissues and weight gain are influenced by nutritive value of feed.

At finisher phase, the average final weight of birds fed the various dietary diets did not show any significant ($P> 0.05$) difference among treatment groups, though higher value was observed in T_3. Data on average daily feed intake shows significant ($P> 0.05$) difference among treatment groups. Data on average daily weight gain were not significantly ($P> 0.05$) different among treatment groups, but higher value was obtained in T_3, when compared to T_4, T_2, T_5 and T_1 respectively. The final weight, feed intake and average daily weight gain of finisher broiler at 56 day performed better in T_3, followed by values obtained other treatment groups. This high performance noted in T_3 could be ascribed to nutrient content of the diet. The report was in line with findings made by Anigbogu *et al* (2011b) and Eneruvie, (2018), who noted that nutrient quality is more beneficial and important than level of nutrient of the dietary feed, which determines the quality of feed given to farm animals. There was no significant ($P> 0.05$) different in the feed conversion ratio at finisher phase, but the value was better in T_4, when compared to T_1, T_2 and T_5 that were similar, and T_3 was lower. The better feed conversion ratio noted in T_4, could be that the birds fed diet containing T_4 utilized the feed better. This is in line with observations made by Belewu *et al*. (2004), who reported an improved feed conversion ratio of goat fed waste based diets.

The results of the cost analysis for starter and finisher birds fed MOFW meals are shown in Table 7 and 8 respectively. In starter phase, there were significance ($P> 0.05$) differences observed across treatments in all the parameters. The cost of feed/kg was high in T_1, and reduced as MOFW meals levels increases. This high cost of feed/kg noted in T_1 among starter birds, could be attributed to high cost of feed materials as recorded in this study. This is in line with Anigbogu *et al.* (2011a) and Eneruvie, (2018), who revealed that high feed cost, has a great impart in cost benefit determination of farm animal production. Cost of feed consumed/bird and cost of production/bird were higher in T_1, followed by T_3, T_2, T_5 and T_4 respectively. The cost of feed consumed/bird and cost of production/bird were higher in T_1, when compared to values obtained in other treatment groups,

though there were significant differences ($p<0.05$) among treatment groups. This could also be attributed to high cost of feed as earlier noted by Anigbogu et al. (2011a) and Eneruvie, (2018). The sales/bird and profit/bird was better in T_1, when compared to values obtained in other treatment groups, this could be attributed to higher weight gain as earlier noted in this study.

The cost of feed/kg was high in T_1 at finisher phase, and also reduced as the MOFW meals levels increases. The high cost of feed/kg noted in T_1 among birds at finisher phase, could be also be ascribed to high cost of feed materials as earlier noted in this research. Cost of feed consumed/bird and cost of production/bird shows significant ($P> 0.05$) differences among treatment groups. T_3 has the highest values, when compared to values obtained in T_2, T_5, T_1 and T_4. These high values of cost of feed consumed/bird and cost of production/bird noted for T_3 could be traced to higher feed intake as earlier observed in this research. Profit/bird was also higher in T_3, when compared to values obtained in T_2, T_5, T_4 and T_1. The high profit recorded in the T_3 and other groups associated with municipal organic waste, could be attributed to low cost of feed/g and higher weight gain earlier noted in this study. This is in agreement with observation made by Anigbogu and Ajekule-Agbalel (2013), who noted higher profit in a similar study using goats..

IV. Conclusion

1. The study revealed the usefulness of municipal organic food waste (MOFW) in broiler fed varying inclusion diets. At starter phase, the birds fed T_1 (control) diets performed better in terms weight gain and profit margin. However, in finisher phase, birds fed diet containing 10% municipal organic food waste (T_3) inclusion will yield best result, in terms of weight gain and profit margin. Based on weight gain and cost analysis noted in this research, farmers are encouraged to include municipal organic food waste (MOFW) meal up to 10% level in broiler diets.

Table1: Proximate Composition of Municipal Organic Food Waste (Test Ingredient)

Parameter	Percentage
Proximate (%)	
Moisture content	14.51
Crude protein	10.61
Crude fibre	3.68
Fat	4.15
Ash	3.72
NFE	58.95
Energy (MEkcal/kg)	2747.40

Table2: Proximate Composition of Feed for Starter Birds

Parameter	Percentage					
	T1(0%)	T2(5%)	T3(10%)	T4(15%)	T5(20%)	SEM
Proximate (%)						
Moisture content	7.05	7.33	7.63	7.86	8.54	0.017
Crude protein	21.66	22.31	22.71	23.81	26.56	0.011
Crude fibre	5.14	7.81	8.13	8.95	9.35	0.009
Fat	6.34	9.04	9.62	9.94	10.22	0.011
Ash	7.53	8.13	7.56	8.91	9.61	0.454
NFE	52.26	45.36	43.34	40.53	35.68	0.008
Phytochemicals (%)						
Tannin	0.02	0.05	0.08	0.13	0.17	0.008
Alkaloid	1.23	1.28	1.22	1.15	1.11	0.006
Saponin	0.35	0.41	0.47	0.51	0.65	0.008
Flavonoid	3.95	4.12	4.45	4.87	5.57	0.010
Oxalate	1.37	1.46	1.60	1.51	1.32	0.007
Phytate	1.38	1.41	1.48	1.56	1.70	0.009

Table3: Proximate Composition of feed for Finisher Birds

Parameter	Percentage					
	T1(0%)	T2(5%)	T3(10%)	T4(15%)	T5(20%)	SEM
Proximate (%)						
Dry Matter	94.35	94.07	93.75	93.18	92.55	0.016
Crude protein	17.41	18.37	18.85	19.56	21.65	0.008
Crude fibre	7.93	8.46	8.95	9.55	9.81	0.008
Fat	4.81	5.03	5.37	5.87	5.72	0.010
Ash	6.42	6.71	6.87	7.15	7.42	0.008
NFE						
Phytochemicals (%)						
Tannin	0.38	0.62	0.93	1.26	1.36	0.007
Alkaloid	1.88	2.31	2.86	3.13	3.83	0.009
Saponin	0.56	0.82	1.36	1.77	2.06	0.007
Flavonoid	4.34	5.03	5.95	7.29	8.61	0.059
Oxalate	4.91	5.14	5.83	6.36	7.31	0.010
Phytate	6.16	6.51	7.02	8.27	7.00	0.010

Table 4: Ingredient Composition of Experimental Diet (Starter Bird)

Feed stuff (kg)	T_1 (0%)	T_2 (5%)	T_3 (10 %)	T_4 (15%)	T_5(20 %)
Maize	53	50.35	47.70	45.05	42.40
Soya Bean	33.00	33.00	33.00	33.00	33.00
Municipal Organic Waste Meal (MOW)	0	2.65	5.30	7.95	10.60
Fish Meal	5.00	5.00	5.00	5.00	5.00
PKC	2.00	2.00	2.00	2.00	2.00
Wheat Offal	2.00	2.00	2.00	2.00	2.00
Bone Meal	2.70	2.70	2.70	2.70	2.70
Limestone	1.20	1.20	1.20	1.20	1.20
Premix	0.30	0.30	0.30	0.30	0.30
Methionine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Salt	0.30	0.30	0.30	0.30	0.30
Calculated Analysis					
Crude protein (CP)	23.08	23.12	23.16	23.21	23.25
Crude fibre(CF)	4.05	4.08	4.10	4.13	4.15
Fat	3.89	3.89	3.90	3.90	3.91
Ash	3.74	3.80	3.87	3.93	4.00
Energy (ME kcal/kg)	2840.78	2822.62	2804.49	2786.36	2768.09

Table 5: Ingredient Composition of Experimental Diet (Finisher Birds)

Feed stuff (kg)	T_1 (0%)	T_2 (5%)	T_3 (10 %)	T_4 (15%)	T_5(20 %)
Maize	60.00	57.00	54.00	51.00	48.00
Soya bean	23.00	23.00	23.00	23.00	23.00
Municipal Organic Waste (MOW)	-	3.00	6.00	9.00	12.00
Fish meal	5.00	5.00	5.00	5.00	5.00
PKC	5.00	5.00	5.00	5.00	5.00
Wheat Offal	2.00	2.00	2.00	2.00	2.00
Bone meal	2.50	2.50	2.50	2.50	2.50
Limestone	1.25	1.25	1.25	1.25	1.25
Premix	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Salt	0.50	0.50	0.50	0.50	0.50
CALCULATED ANALYSIS					
Crude protein (CP)	19.86	19.91	19.97	20.04	20.06
Crude fibre (CF)	3.92	3.95	3.98	4.01	4.04
Fat	4.03	4.03	4.04	4.04	5.05
Ash	3.38	3.45	3.52	3.60	3.67
Energy (ME kcal/kg)	2920.02	2897.46	2879.15	2854.39	2832.88

Table 6: Performance Characteristics of Broiler (0-28 days and 28-56 days) Fed Municipal Organic Food Waste (MOFW)

Parameter	Percentage					
	T1(0%)	T2(5%)	T3(10%)	T4(15%)	T5(20%)	SEM
Initial Weight (g)	36.60	35.40	34.20	36.60	33.16	1.26
Final Weight (g)						
0-28 days	476.40	428.00	423.20	365.60	424.40	25.62
28-56 days	1419.00	1474.20	1508.80	1417.60	1447.20	100.64
Feed Intake/bird/day (g)						
1-28 days	39.60	39.40	40.60	39.20	40.60	1.36
29-56 days	95.80^{c}	105.20^{b}	110.80^{a}	97.00^{d}	103.60^{c}	3.27
Weight Gain/bird/day (g)						
1-28 days	16.00	14.20	14.00	12.00	14.00	0.96
29-56 days	33.60	37.40	38.80	37.60	36.60	3.37
Feed Cov. Ratio/bird/day (g)						
1-28 days	2.40	3.00	2.80	3.40	2.80	0.24
29-56 days	2.80	2.80	3.20	2.60	2.80	0.29
Mortality						
1-56 days	15.55	22.44	26.67	15.55	15.55	0.31

Table 7: Cost Analysis of Starter Broiler Fed Municipal Organic Food Waste (MOFW)

Parameter	Percentage					
	T1(0%)	T2(5%)	T3(10%)	T4(15%)	T5(20%)	SEM
Cost of Feed/kg (₦)	588.00	578.00	568.00	558.00	548.00	0.00
Cost of Feed Consumed/bird(₦)	651.40	639.40	648.20	613.40	624.20	21.35
Cost of Production/bird (₦)	1605.20	1593.40	1602.00	1567.40	1578.00	21.42
Sales/bird (₦)	1667.00	1497.60	1481.60	1280.60	1485.00	89.41
Profit/bird (₦)	62.00	-71.80	-60.00	-286.40	-92.20	90.04

Table 8: Cost Analysis of Finisher Broiler Fed Municipal Organic Food Waste (MOFW)

Parameter	Percentage					
	T1(0%)	T2(5%)	T3(10%)	T4(15%)	T5(20%)	SEM
Cost of Feed/kg (₦)	570.00	559.00	548.00	536.00	525.00	0.00
Cost of Feed Consumed/bird(₦)	1530.80^{d}	1646.60^{b}	1699.60^{a}	1458.60^{c}	1592.80^{c}	51.02
Cost of Production/bird (₦)	2484.60^{d}	2600.60^{b}	2653.40^{a}	2412.00^{c}	2546.60	51.05
Sales/bird (₦)	4966.60	5160.00	5280.60	4961.20	5096.20	350.61
Profit/bird (₦)	2481.80	2559.40	2627.40	2549.20	2549.60	350.35

REFERENCES

[1]. Abeke, F.O., Ogundipe, S.O., Dafwang, I.I., Sekoni, A.A., Abu, A. and Adeyinka, I.A. (2008). Effect of duration of cooking on some anti-nutritional factors of nine varieties of Lablap purpureus bean. Nigerian Journal of Animal Production. 35(2): 217-223.
[2]. Anigbogu, N.M., Ibe, S.N., Anosike, J.C. and Assam, E.M. (2009b). The effect of live- enzyme(Sawdust Treated with Zymomonasmobilis) on the performance characteristics of red Sokoto goats.Journalof sustainable Agriculture and Environment. 11(1): 12-18.
[3]. Anigbogu, N.M. (2011a). Application of mathematical model on efficient conversion of crossenergy. Journal of Engineering and Applied Sciences. 42(2): 20-29.
[4]. Anigbogu, N.M. and Ajekule-Agbale, O.I.L. (2013a). Performance and Economic Benefits of Zymomonasmobilis or in Combination with Asparagus oryzae Treated Sawdust Fed to Goats as feed. Nigerian Agricultural Journal, 44(NOS.1&2):189-197.
[5]. Belewu, M.A., Muhammed, Y.O. and Ikwuomola, B.O. (2004). Comparative nutrition evolution of fungus and alkali treated rice husk by rats. Moore Journal of Agriculture Research. 5(2): 129-134.
[6]. Chow, W.L., Chong, S. Lim,J.W., Chan, W.J., Chong, M.F., Tiong, T.J., Chin,J.K. and Pan, G.T. (2020). Anaerobic co-digestion of wastewater sludge: A review of potential cosubstrates and operating factors for improved methane yield. Processes. **8**, 21 (2020).
[7]. Eneruvie, B.E. (2018). Utilization of compounded/municipal organic waste as feed for giant African land snail (Archachatinamarginata). A thesis submittedto the Department of Animal Science, MichealOkpara University of Agriculture, Umudike, AbiaState.
[8]. Ferguson, J.D. (2019). Food Residue, Loss and Waste as Animal Feed. Mater. Sci. Mater. Eng., 15.García, A.J., Esteban M.B., Marquez, M.C. and Ramos, P. (2005).
[9]. Biodegradable municipal solid waste: characterization and potential use as Animal feedstuffs. Waste Manage. **25**, 8 (2005).
[10]. García, A.J., Esteban M.B., Marquez, M.C. and Ramos, P. (2005). Biodegradable municipal solid waste: characterization and potential use as animafeedstuffs. Waste Manage. **25**, 8(2005).
[11]. Hoornweg, D. and Bhada-Tata, P. (2012).What a Waste: A Global Review of Solid Waste Management.Urban Develop Series knowledge Pap.World Bank, 15.
[12]. Ibikunle, R.A., Titiladunayo, I. F., Akinnuli, B. O., Osueke, C.O., Dahunsi, S.O. and Olanyaju, (2019). Impact of Physical and Chemical Properties of Municipal Solid Waste on its Electrical Power Rating Potential. Journal of Physics: Conference Series **1299-** 012003.
[13]. Kaza, S., Yao, L.C., Bhada-Tata, P. and F. V. (2018).Woerden.What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. Urban Dev. World Bank, Washington, DC, 295p.
[14]. Okonkwo, A.G., L.G. Isaac., I. Nkanga and O.O. Usoro, (2000). Effect of various Feeding regimeson the performance of snails. Book of Proc. 25th Annual NSPA Conference 19- 23, March, 2000 Umudike pp. 314-315.
[15]. Ogunbode, A.A., Akanni, E.O., Abegunde, P.T., Raji, M.O. and Fatofa, O.S.G. (2013). Determination of chemical composition of Sesbania sesban seeds. Proceedings of the 18th Annual Conference of Animal Science Association of Nigeria, 8-12 September, 2013, Abuja.
[16]. Steel, R.G.D. and Torrie, J.H.T. (2000).Principles and Procedures of Statistics.A Biochemical approach.(2nded.). McGraw Hill Book Inc, New York.
[17]. Ugbomeh, B. A. (2010). A special analysis of population distribution and housing patterns: A Case Study of Abraka Delta State of Nigeria.An International Multi-Diciplinary Journal, Ethiopia.Vol 4 (4).Pp 447-458.